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THE GENUS ANTENNARIA IN NEW ENGLAND.

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JUN 15 1890

BY MERRITT L. FERNALD.

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No. 8.—*The Genus Antennaria in New England.*

By Merritt L. Fernald.

The genus Antennaria has recently attracted a remarkable degree of attention from American systematists. As treated in the standard manuals of the country, the northeastern states are given only one very polymorphous species, the so-called *Antennaria plantaginifolia.* During the past year, however, no less than eight articles have appeared, each of them either describing or discussing different plants which have passed under that name. Many inquiries have been made about the recent treatment of these plants; and as the descriptions are either very scattered or else in journals hardly accessible to most New England botanists, the following synopsis of the New England species, as now understood, has been prepared. In determining these New England forms I have been greatly aided by Prof. E. L. Greene of the Catholic University at Washington, who has kindly compared specimens I have sent him with the types of some of his species, and who has furnished me specimens of other species about which there has been doubt.

In a recently published article[1] I have discussed the species which seems most probably to be the plant to which Linnaeus referred as *Gnaphalium plantaginifolium*, and to which the name *Antennaria plantaginea* was subsequently given by Robert Brown. In the same place I have stated the reasons why this name of Brown is taken up for the plant. That question need not now concern us; but as there has been great doubt in regard to the plant taken to represent *A. plantaginea*, it seems advisable to reiterate and if possible to make clearer the discussion of this point which was taken up in the article above referred to.

Of course the fundamental question to be settled, before describing new species in this group, is the identity of the Linnaean *Gnaphalium plantaginifolium.* Linnaeus described this plant in 1753[2], but his description is so brief and with so little of a specific character that it is necessary to rely upon the earlier descriptions cited by him. There are two of these descriptions referred to, one by

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[1] Asa Gray bulletin, vol. 5, p. 91.

[2] Sp., ed. 1, p. 8[illegible]. 57[illegible]

Gronovius, and the other, accompanied by a figure, by Plukenet. Gronovius, too, cites Plukenet's description and figure, so that it is upon these that the decision must largely depend. Accompanying my article in the Asa Gray bulletin, a plate was published giving a careful copy by Mr. Charles E. Faxon of Plukenet's figure. It represents a plant with a stem bearing a few scattered lanceolate leaves, and surmounted by a globular cluster of 8 or 9 heads, and at the very base are five small spatulate leaves. Two stolons are represented as coming from the base of the plant, one of them with a terminal cluster of very large ovate triple-nerved leaves; the other more elongated and bearing a few scattered small leaves similar to those of the flowering stem and a couple of ovate triple-nerved terminal ones. Plukenet's descriptive note,[1] "Gnaphalium Plantaginis, folio Virginianum, White Plantain (*i. e.*) Plantago candida Nostratibus, vulgo," was short; but, accompanied by the characteristic figure, it should be of service in settling what plant he had in mind. The small basal leaves, accompanied by such very large terminal ones as Plukenet represents, are not matched by any plant with which we are familiar; but considering the age and rather conventional character of the drawing it is most nearly approached by one of our common species.

In discussing, in the article already mentioned, the plant which I have taken to match Plukenet's figure and note I have said: "The plant which this figure represents, it will be remembered, came from Virginia, and, in looking through our American plants for the species which approaches nearest the original plate, we find a form coming not only from Virginia, but growing in some abundance from Maine and Wisconsin south to Louisiana. This plant has not only the large ovate basal leaves and the scattered lanceolate cauline ones of Plukenet's drawing, but the stems and leaves (at least when young) are covered with a conspicuous white pubescence, which might well have suggested the 'White Plantain (*i. e.*) Plantago candida' of Plukenet."

Continuing the discussion from which the foregoing extract is taken, I showed how different from this white-pubescent plant, which was taken for *A. plantaginea*, was the recently described *A. parlinii*. The drawing by Mr. Faxon of the latter plant brings out very clearly many of the striking differences, but the very important color characters could be brought out only by the descriptive note: "The plant is conspicuous in the field on account of the smooth, bright-green upper surfaces of the basal leaves. The lower surfaces, however, are of a clear-white color, making with the bright-green a marked contrast. Another characteristic difference between the two plants, and one which is better brought out in the drawing, is in the cauline leaves. In *A. plantaginea*, as we have seen, the white-tomentose cauline leaves are lanceolate, acute and rather remote. In *A. parlinii*, on the other hand, the thicker oblong obtuse or acutish cauline leaves are more crowded below, and they are not white-tomentose, but green above and sordid-pubescent beneath, and covered on both faces with elongated [stipitate] glands. The stems, which in *A. plantaginea* are green, in *A. parlinii* are generally purple; and surely no one seeing the plant would think of Plukenet's 'White Plantain (*i. e.*) Plantago candida.'"

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[1] Pluk. Alm., p. 171.

The striking white pubescence of the plant taken for *A. plantaginea*, and its strong habital resemblance to the Plukenet figure were considered nearly convincing evidence, and in discussing the plant at that time I had no thought but that Professor Greene had arrived at the same conclusion. Apparently he did lean then somewhat toward this decision, but, in a late number of his journal,[1] he described as a new species the white-pubescent plant, giving it the name *A. decipiens*, and leaving to represent *A. plantaginea* a stouter plant with more coriaceous basal leaves which are bright green and quite glabrous on the upper surfaces. In the same article where these plants are discussed by Professor Greene my *A. parlinii* was recognized as a distinct species. After corresponding with Professor Greene on the subject and receiving from him specimens of what he called *A. plantaginea* and also his *A. decipiens*, I found it impossible to reach his conclusions. The plant which he described as *A. decipiens* is exactly the form which I maintained was *A. plantaginea.* It is characterized, as Professor Greene emphasizes, by the white pubescence of the upper leaf-surfaces, and it also has small scattered cauline leaves, *i. e.*, it has the most striking characters of Plukenet's "*Plantago candida.*"

On the other hand, the glabrous-leaved plant, which Professor Greene referred to Plukenet's figure and description, is hardly distinguishable from what I have described and Mr. Faxon has figured as *A. parlinii.* The stems, though, are greener, and the broader involucral bracts white-tipped. The remarkable point is that in some of the specimens of this plant which Professor Greene has sent me not only are the habital and foliage characters as in that species, but the stolons are invested with many of the unique stipitate purple glands which are so characteristic of the young growths of *A. parlinii.* How so unusual a character in the genus as is this one could have so long escaped the attention of Professor Greene who made no mention of it in his descriptions and who kept separate from his plant *A. parlinii* is indeed hard to understand.

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[1] Pittonia, vol. 3, p. 278.

Leaving this question, though, we must return again for a moment to the fundamental one of the Linnaean *Gnaphalium plantaginifolium.* Professor Greene's argument for calling this smooth-leaved species the Plukenet plant was that it had firmer leaves than the other, and consequently the basal leaves were more like plantain. But in this connection it should be noted that in his description of *A. decipiens* (the pubescent-leaved species), aside from the thinner texture and the pubescence of the leaf, he gives us no leaf differences. In fact, from his description, "of the large dimensions, short stolons, broad petiolate triple-nerved leaves, and the general habit of *A. plantaginifolia,*" one is led to infer that in size and outline the leaves are essentially the same. This is the case in specimens I have examined. A Louisiana specimen of his *A. decipiens* has the leaves practically as large as those he has sent me of what he called *A. plantaginifolia* which, in the accompanying letter, he says show "uncommonly well the fully developed leaves." The basal leaves of the two species are, then, alike in size and outline: their differences are alone those of color, pubescence, and texture. Professor Greene's *A. decipiens* has the old basal leaves generally glabrate dull and often rusted or blotched with purplish or brown. *A. parlinii* has the basal leaves bright clear green and glabrous from the first. Even admitting Professor Greene's statement that the leaves of the latter are more like plantain in texture, — a statement which, when one considers the variability of our commonest introduced plantain, is not entirely convincing, — one may perhaps be permitted to ask whether, if Plukenet had only one of these plants and did not know the other, he would make such a distinction; and whether, in view of the figure and note which he published, it is not better to consider as representing his plant the species which has the greatest habital resemblance to his figure and which best matches the impression given by his description "*Plantago candida.*"

Later, however, Professor Greene has reversed[1] his view of the question — hardly seven weeks since he modified his first decision; and now he announces the same conclusion which was published by me in the Asa Gray bulletin. Though he agrees that the plant he described as *A. decipiens* is probably the plant figured by Plukenet, and, therefore, *Antennaria plantaginea* R. Br., he does not recognize the specific identity of the smooth-leaved species which he had formerly called *A. plantaginifolia* and the plant I have described as *A. parlinii*. At any rate, he describes this smooth-leaved plant as a new species, *A. arnoglossa*, though he cites no type specimen or specimens; and his description hardly differs from that of *A. parlinii* except in the addition of a characterization of the staminate plant and the description of the bracts of the pistillate heads where he says, "tips of their involucral bracts from obovate-oblong to oblong-linear, obtuse, seldom even the innermost acutish." Plants sent me by Professor Greene early this spring as typical of what he then called *A. plantaginifolia*, and which must now represent his *A. arnoglossa*, show the bracts of the pistillate heads to have white petaloid tips, the outer ones mostly obtuse. In *A. parlinii* the bracts have scarious acute tips. Beyond this difference I am unable to find any points by which to separate the plants, and I cannot think that the involucral characters are of sufficient constancy to justify our making specific distinctions upon them alone. It seems to me better in view of the variability of this involucral character to consider *A. arnoglossa* a southern variety of *A. parlinii* parallel with similarly distinguished forms of *A. neodioica* and *A. canadensis*.

Doubtless much yet remains to be made out before we shall have a satisfactory knowledge of these very common and long overlooked roadside plants, but, for the present, the following descriptions and notes will furnish a synopsis of all the species known to us in New England, and, so far as possible, it states the range of each species within our territory.

Synopsis of Species.

* Basal leaves and those at the tips of the assurgent stolons large, 5 to 12 cm. (in reduced specimens rarely 4 cm.) long.

+- Leaves dull, invested above with nearly persistent white pubescence, only the oldest basal ones sometimes glabrate: stems and stolons with no stipitate dark glands.

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[1] Pittonia, vol. 3, p. 318.

A. plantaginea R. Br. Variable in size, from 1 to 4.5 dm. high, the stems, stolons, and younger leaves invested with whitish glandless pubescence: basal leaves distinctly 3-nerved, ovate or obovate, generally mucronate, the blades equaling or exceeding the petioles; cauline leaves rather scattered, lanceolate: heads densely or loosely corymbose: involucre in the pistillate plant 6.5 to 8.5 mm. high; the linear bracts with slightly lanate green or tawny herbaceous bases and more or less conspicuous white or purplish scarious or petaloid tips; the outer bracts generally blunt, the inner acute or bluntish: heads of the smaller staminate plants shorter, the less distinctly imbricated bracts with blunt oblong or linear-oblong, generally radiating, white petaloid tips.— Trans. Linn. soc., vol. 12, p. 123; Fernald, Asa Gray bull., vol. 5, p. 92, pl. 2, fig. 6, 7. *A. plantaginifolia* Hook., Fl. Bor.-Amer., vol. 1, p. 330; Greene, Pittonia, vol. 3, p. 173, as to staminate plant. *A. decipiens* Greene, Pittonia, vol. 3, p. 278. *Gnaphalium plantaginifolium* L. Sp., ed. 1, p. 850. *G. plantagineum* L., Syst. nat., ed. 12, p. 545. Common in southern New England where it flowers in late May and early June; extending northward to South Hero, Vt. (L. R. Jones), Jaffrey, N. H. (E. L. Rand and B. L. Robinson), Orono, Me. (George B. Fernald), and eastward to Mt. Desert Island, Me. (E. L. Rand). Professor Greene gives the southern limit of this species (his *A. decipiens*) as Maryland and Virginia. The following specimens in the Gray Herbarium from more southern stations are referred here: rich woods, Jackson, Tenn. (S. M. Bain, no. 69), Louisiana (Dr. Hale), the latter specimens pistillate plants.

var. **petiolata**. Plant lower and more slender than the species: basal leaves ovate-spatulate or obovate-spatulate, obtuse or acutish, on slender elongated petioles: pistillate heads more closely aggregated; involucre often more purple tinged, generally shorter and with narrower bracts.— North Berwick, Me., June, 1897 (J. C. Parlin, no. 1,016), Jaffrey, N. H., May 29 and 31, 1897 (E. L. Rand and B. L. Robinson, nos. 411, 412), Medford, Mass., May 11, 1854 (Wm. Boott), Waverly, Mass., May 26, 1895, and Lexington, Mass., June 6, 1897 (B. L. Robinson). A very common plant in eastern Massachusetts, forming extensive carpets on dry slopes and in open woods. At Providence, R. I., and particularly in the Elmwood district, Mr. J. F. Collins and I found many acres of plants presenting all imaginable gradations from this extreme variety to typical *A. plantaginea*.

++ Leaves of the stolons bright green, glabrous above, or in one form with arachnoid pubescence above, young stems and stolons bearing dark stipitate glands.

A parlinii Fernald. Plants generally tall, 1.5 to 5 dm. high, averaging stouter than the preceding species: stems purplish or sometimes green, with the stout stolons thinly white-silky or lanate above, and generally bearing, especially below, or near the inflorescence, stipitate purple glands: leaves thicker and greener than in the last; the basal ones distinctly 3-nerved, subcoriaceous, from broadly obovate to obovate-spatulate, rounded or obtuse and generally mucronate at the tips; lower cauline leaves more numerous and more crowded than in *A. plantaginea*, oblong or oblong-lanceolate, obtuse or acutish, mucronate, glandular on both faces, green above, sordid beneath: heads of the pistillate plant loosely or densely corymbose: involucre 8 to 10.5 mm. high, of about 3 rows of linear bracts with purple or greenish herbaceous bases and scarious tips; the outer bracts acute or obtuse, the inner long-attenuate: staminate plant unknown.— Garden and forest, vol. 10, p. 284, and Asa Gray bull., vol. 5, p. 92, pl. 2, fig. 1 to 5; Greene, Pittonia, vol. 3, p. 277. On woodland knolls and rich slopes or even in open rocky ground, flowering in late May and in June. Specimens have been examined from the following stations: Veazie, Me. (M. L. Fernald), Mt. Desert Island, Me. (E. L. Rand), North Berwick, Me. (J. C. Parlin and M. L. Fernald), Jaffrey and Dublin, N. H. (E. L. Rand and B. L. Robinson), Lexington, Mass. (B. L. Robinson and J. M. Greenman), Elizabeth, N. J. (Halsted's American weeds, no. 134, at least in part). The stipitate glands, which are abundant in early spring specimens, are either deciduous or very soon shrivelled—at any rate they are almost invariably absent in mid-summer specimens.

var. **arnoglossa**. Stems mostly greenish: involucral bracts of pistillate heads with broader white petaloid tips, the outer mostly obtuse, the inner hardly attenuate; "male heads," according to Professor Greene, "5 to 8, in a more dense cluster; milk-white tips of the involucral bracts very ample and showy, obovate or oblong-obovate, obtuse or nearly truncate, often marginate." *A. plantaginifolia* Greene, Pittonia, vol. 3, p. 173, as to pistillate plant, and l. c., 277, 278. *A. arnoglossa* Greene, l. c., 318.— Of more southern range than the type, occurring in both staminate and pistillate forms near Washington, but found only as a pistillate plant at New Haven, Conn., where it grows in great abundance with *A. plantaginea*, on the wooded slope of Mill Rock (A. W. Evans and M. L. Fernald).

var. **ambigens**. Generally shorter than the two preceding: stems, stolons, and leaves less glandular: cauline leaves larger; leaves of the stolons arachnoid above, and with early deciduous tomentum beneath: involucral bracts as in var. *arnoglossa*.—*A. arnoglossa* var. *ambigens* Greene, l. c., 320.—A puzzling form, in its pubescent leaves somewhat approaching *A. plantaginea*, but well distinguished by its brighter green color, larger, more crowded cauline leaves and the peculiar stipitate glands. Rather rare and only as a pistillate plant about Washington (E. L. Greene), but in both staminate and pistillate forms on river banks at Agricultural College, Mich. (C. F. Wheeler). In New England only pistillate plants are known, those from the following stations: Jaffrey, N. H. (E. L. Rand and B. L. Robinson), Wellesley, Mass. (J. M. Greenman, E. F. Williams and M. L. Fernald), Elmwood, Providence, R. I. (J. F. Collins and M. L. Fernald), New Haven, Conn. (D. C. Eaton).

* * Basal leaves and those at the tips of the stolon small, 2 to 4 cm. long (in very luxuriant plants rarely 5 cm. long).

+ Basal leaves, or at least those at the tips of the assurgent stolons, differentiated into petioles and obovate or spatulate blades: heads loosely corymbose or by elongation of the stem becoming subracemose, the lower ones often on elongated pedicels.

++ Leaves dull, invested above with nearly persistent white pubescence, only the oldest basal ones sometimes glabrate.

A. neodioica Greene. Stems slender, 1.5 to 4 dm. high, invested with very flocculent white pubescence; stolons numerous, rather short, and very leafy: basal leaves distinctly mucronate, the oldest ones sometimes glabrate; cauline leaves lance-attenuate, small, rather remote: involucre of the pistillate plant 6 to 9 mm. high, the bracts with green or tawny bases and scarious tips, the outer short and obtuse, the inner lanceolate, acutish or blunt; "bracts of the male involucre," according to Professor Greene, "all very broad and obtuse, or truncate, or even emarginate."—Pittonia, vol. 3, p. 184 and 280.—Apparently a common species on woodland knolls and banks or even in the crevices of dry ledges, flowering from late May to the middle of July. The following New England specimens, all pistillate, have been referred here: Orono, Me. (M. L. Fernald), Mt. Desert Island, Me. (E. L. Rand), Franconia, N. H. (Edwin Faxon), Jaffrey, N. H. (E. L.

Rand and B. L. Robinson), Lexington, Mass. (B. L. Robinson), Providence, R. I. (J. F. Collins and M. L. Fernald). Autumnal leaf-specimens from rocky shores and mountain summits in Aroostook and Penobscot Counties, Me., are to be referred here or to one of the following.

var. **attenuata.** Involucral bracts narrower, with scarious tips; the outer acute, the inner long-attenuate.— The common form in northern New England, habitually like *A. neodioica* but with its narrow attenuate bracts presenting a rather marked difference. Knolls in woods, base of Mt. Kineo, Me., July 9, 1897 (F. S. Collins and M. L. Fernald), also in woods and on rocky banks, Masardis, Island Falls, Sangerville and Orono, Me. (M. L. Fernald), abundant on Mt. Desert Island, Me. (E. L. Rand, Sara W. Boggs), Franconia, N. H. (Edwin Faxon), New Haven, Conn. (A. W. Evans and M. L. Fernald).

var. **petaloidea.** Heads large, the involucre 9 or 10 mm. high; the obtuse or acutish bracts with conspicuous white petaloid tips, equaling or exceeding the herbaceous bases.— Jaffrey, N. H., May 31, 1897 (E. L. Rand and B. L. Robinson), also Farmington, Me. (C. H. Knowlton), Franconia, N. H. (Edwin Faxon). Large leaved forms of this may usually be distinguished from reduced specimens of *A. plantaginea* by the numerous short stolons and the less distinctly triple-nerved leaves.

++ ++ Basal leaves clear green and glabrous above (the young leaves very rarely with a few early-deciduous hairs).

A. canadensis Greene. Stems slender, 1.5 to 5.5 dm. high, invested with flocculent white pubescence; stolons short and numerous, similar to those of *A. neodioica*: basal leaves spatulate or obovate-spatulate, acute or obtuse and mucronate; cauline leaves lance-attenuate, small and rather remote: involucre of the pistillate plant 7 to 10 mm. high, slightly lanate below; bracts linear or linear-lanceolate, chartaceous or herbaceous below, with whitish scarious or petaloid tips; the outer acute or obtusish, the inner attenuate ones often chartaceous or herbaceous nearly to the tips: staminate heads smaller, the bracts with broader obtuse white petaloid tips. — Pittonia, vol. 3, p. 275.— A common late flowering species in northern New England, specimens having been examined from the following stations: dry slopes and summits of Mt. Chase, Penobscot Co., Russell Mt., Blanchard, Peaked Mt., Clifton, and dry fields, Foxcroft and Milo, Me. (M. L. Fernald), dry gravelly soil, Orono, Me. (George B. Fernald), in dry open places or in woods, Mt. Desert Island, Me. (E. L. Rand, Sara W. Boggs), in almost pure sand, North Berwick, Me. (J. C. Parlin), hillsides and pastures, Franconia, N. H. (Edwin Faxon), open hillsides, Jaffrey, N. H. (E. L. Rand and B. L. Robinson), Charlotte, Vt. (C. G. Pringle). Specimens from Farmington, Me. (C. H. Knowlton), Lexington, Mass. (B. L. Robinson), Wellesley, Mass. (J. M. Greenman, E. F. Williams and M. L. Fernald), and some Mt. Desert plants are somewhat intermediate between this and the following.

var. **randii**. Stems mostly tall, 3 to 5.5 dm. high; stolons more slender and elongated: youngest leaves often sparingly pubescent, very soon glabrate: heads larger, involucre 8 to 11 mm. high; the broader more distinctly imbricated bracts with conspicuous long white petaloid tips, the outer blunt, the inner acute or bluntish.—A very attractive plant collected by Mr. Rand in 1897, at various stations on Mt. Desert Island, Me.: roadside near Ripples Pond, July 3; roadside, head of Northeast Arm, Great Pond, July 3; near Indian Point, July 1; High Head, July 1; shore, Somes Harbor, July 5; pasture, Somesville, July 2, and at many other stations.

+ + Basal leaves cuneate or spatulate, without distinct petioles: stolons slender, hardly assurgent.

A. neglecta Greene. Stems slender, the pistillate plants 2 or 3 dm. high; stolons slender, prostrate, usually elongated, bracteate throughout, except at the leafy tip: basal leaves and those at the tips of the stolons at first often appressed silky above, soon glabrate; cauline leaves remote, small, linear, or linear-lanceolate: heads rather few, short-pedicelled, at first densely clustered, soon becoming distinctly racemose: involucre of pistillate plant 7.5 to 9 mm. high; bracts linear or linear-lanceolate, greenish, brown, or purplish below, with more or less scarious or petaloid white tips, the outer mostly obtuse, the inner obtuse or acute: heads of staminate plants smaller, the involucral bracts with broad white petaloid tips.— Pittonia, vol. 3, p. 173, 274.—The commonest species in southern New England, growing in almost every dry barren field and on sunny hillsides, and flowering in April or early May. The most northern specimens examined come from Charlotte, Vt. (C. G. Pringle), Franconia, N. H. (Edwin Faxon), Farmington, Me. (C. H. Knowlton).

var. **subcorymbosa**. Taller, 3 to 4.5 dm. high; heads loosely subcorymbose on elongated pedicels, the lowest sometimes 6 cm. long:

involucral bracts nearly all acute, the inner long attenuate. — Roadside, "Davis Farm," Seal Harbor, Mt. Desert Island, Me., July 9, 1897 (E. L. Rand).

A. campestris Rydberg. Plant forming dense closely appressed mats; stems low, 1 dm. or less in height; stolons shorter and rather thicker than in the former: basal leaves broader, obovate-cuneate, at first loosely pubescent above, the pubescence soon nearly all deciduous, often leaving a narrow white pubescent border to the leaf: heads densely clustered, perhaps not becoming racemose.— Bull. Torrey bot. club, vol. 24, p. 304.— This has been considered a species confined to the prairies west of the Mississippi, but it is apparently a frequent plant in rather rich dry fields or even upon ledgy shores in northern Maine. The following Maine specimens have been examined: ledgy river banks, Houlton and Island Falls, and dry fields, Milo (M. L. Fernald). Further study may show this plant to be rather an extreme form of the preceding species, but from our present knowledge, it seems wisest to keep them apart.

Aside from the surprising number of apparently distinct species which we have long overlooked—a case which, though an extreme, may be taken as a fair type of the questions which are frequently presenting themselves in American systematic botany — these Antennarias seem to present some further problems of a biological character. The plants are, so far as we know, dioecious; *i. e.*, the individual plants bear only staminate or pistillate flowers. The staminate flowers, however, are not strictly without a trace of the pistil, for they have rudimentary thickened and undivided styles. The flowers having these undivided styles soon shrivel without producing akenes. In the other or pistillate flowers, no stamens seem to be present, the elongated generally purple style is deeply 2-cleft, and abundant akenes are produced. From the foregoing descriptions it will be seen that all the species produce stolons, often in great abundance; and by means of these offsets the plants very soon cover large areas of ground. The earliest flowering species, *Antennaria neglecta*, is perhaps the most abundant. It grows in barren fields or on sunny hillsides almost everywhere and flowers in late April or early May. In this species both staminate and pistillate plants are very abundant. In the nearly related species, *A. campestris*, too, the staminate plants are apparently about as common as the pistillate. In one other species, *A. plantaginea*, a later plant than *A. neglecta*, staminate plants are sometimes found, though compared with the pistillate colonies they are often very scarce. In the other three species staminate plants are either quite unknown or else exceedingly rare. *A. neodioica,* which is abundant in New England, is known with us only as a pistillate plant. Further south, however, in Pennsylvania and Virginia, the staminate plants, according to Professor Greene, are frequent. Among thousands of specimens of *A. canadensis,* which have been examined from all over northern New England, only two stations of staminate plants have been detected; and in the case of the very characteristic *A. parlinii,* though many acute observers have watched in New England, only pistillate plants have thus far been found. Further south and west, however, staminate specimens of the two varieties have been collected. In these cases of *A. neodioica, A. parlinii,* if not likewise *A. canadensis,* though staminate plants may yet be detected, it must be apparent that they are very unusual. In the cases where staminate plants are known, it is noteworthy that the pollen is apparently very early discharged, at least the staminate inflorescence very quickly shrivels, though it remains entirely recognizable for a long time thereafter. In New England, then, so far as the evidence yet shows, of the six species only three have staminate plants in any abundance, though a fourth is known rarely to produce them.

The question must arise, how are these plants perpetuated, and do they all produce seed? From a superficial examination the akenes of all the species seem plump and as full of vitality as those of most Compositae. I am not aware, though, that any one has made tests of their fertility. Professor Greene asserts that the seeds of these plants are good,[1] though I cannot state to what extent he has experimented with them; and from this decision he draws the inference that we may here have a case of parthenogenesis.

Another possibility has presented itself, that the ovaries of these plants may be fertilized by pollen from what seem superficially to be quite different species. In southern New England, where the staminate plants of *A. plantaginea* are not rare, this might not be absolutely impossible; but in the Franconia region, where one of the keenest of our New England observers, Mr. Edwin Faxon, has found no trace of that species, and got staminate plants of only *A. neglecta,* — shrivelled long before the other species begin to bloom, — such an explanation seems very unsatisfactory. In northern Maine, too, where no *A. plantaginea* was found, I examined young pistillate flowers of *A. canadensis* and *A. neodioica* in July, when no staminate flowers could be discovered.

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[1] Plant world, vol 1, p. 102.

As already stated, propagation by stolons is highly developed in these Antennarias. This is so much the case that we find the plants growing in extensive colonies apparently all originating from one central plant. Or at other times colonies of different species originating near together soon produce an almost inseparable tangle of stolons and offsets. It has been suggested that as this vegetative method of propagation has become so highly developed, the necessity of reproduction by seed has been diminished; and that now, though the plants appear to produce good seed, and may sometimes do so, they are most often spread, as seems to be the case, by the numerous stolons. If these plants were often reproduced by the abundant akenes, we should expect to find scattered young plants in large numbers; but such scattered individuals, if they occur at all, are certainly very unusual. Instead we find colonies of plants near together, and in the case especially of the small-leaved species they form extensive mats.

The question is by no means solved: it is rather merely opened. It is such a problem as can be settled only by careful cultures; but for those who, during the spring and early summer, can give it critical attention, it offers a most attractive and productive field for investigation.

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